

Claims

1. (currently amended) Apparatus An apparatus for growing an ingot of single crystal silicon comprising:

a crucible adapted to contain a melt;
a lift mechanism located over the crucible;
a support body suspended from the lift mechanism; and
a pivoted member comprising at least one rod holder suitable for holding a silicon rod and a single crystal seed held in a fixed position relative to the rod holder, the pivoted member being pivotally mounted on the support body for movement relative to the support body about a generally horizontal pivot axis and the pivoted member having a center of gravity located such that, when at least one silicon rod is connected to the pivoted member, the pivoted member is positioned with the rod holder extending downwardly and, when no silicon rods are connected to the pivoted member, the pivoted member is positioned with the seed extending downwardly.

2. (currently amended) The apparatus of claim 1 further comprising An apparatus for growing an ingot of single crystal silicon comprising:

a crucible adapted to contain a melt;
a lift mechanism located over the crucible;
a support body suspended from the lift mechanism;
a pivoted member comprising at least one rod holder suitable for holding a silicon rod and a single crystal seed held in a fixed position relative to the rod holder, the pivoted member being pivotally mounted on the support body for movement relative to the support body about a generally horizontal pivot axis and the pivoted member having a center of gravity located such that, when at least one silicon rod is connected to the pivoted member, the pivoted member is positioned with the rod holder extending downwardly and, when no silicon rods are connected to the pivoted member, the pivoted member is positioned with the seed extending downwardly; and

at least one rod of silicon suspended from the pivoted member such that the rod hangs over the crucible, the rod having a free end nearest the crucible and an attached end at the top of

attached end, with the pivoted member engaging the rod only at a level above the bottom of the groove.

3. (original) The apparatus of claim 2 comprising a plurality of rod holders and a plurality of silicon rods, with each of the rods being supported by one of the rod holders.

4. (original) The apparatus of claim 2 wherein:

the groove is a keyhole that has a neck portion and a body portion located below the neck portion, with the neck portion being narrower horizontally than the body portion; and

the rod holder is received in the keyhole and is shaped to have a neck portion and a body portion located below the neck portion with the neck portion of the rod holder being narrower horizontally than the neck portion of the keyhole, the body portion of the rod holder being narrower horizontally than the body portion of the keyhole, and the body portion of the rod holder being wider horizontally than the neck portion of the keyhole so that the rod rests on the head portion of the rod holder.

5. (original) The apparatus of claim 2 wherein:

the rod has a generally cylindrical side surface that defines one or more recesses; and
the pivoted member further comprises a ring ditch holder that has two or more prongs that extend generally inwardly toward the axis of the rod and that are received in the one or more recesses.

6. (original) The apparatus of claim 5 wherein:

the one or more recesses is a ring ditch that encircles and extends inwardly from the generally cylindrical side surface at a location below the top of the rod to provide a radially extending flange that has a lower surface extending substantially perpendicular to the rod axis; and

the lower surface rests on at least two of the prongs.

a pivoted member comprising at least one rod holder suitable for holding a rod and a single crystal seed in a fixed position relative to the rod holder, the pivoted member being pivotally mounted on the support body for movement relative to the support body about a pivot axis; and

an attachment for connecting the support body to a seed cable or shaft of a CZ furnace so that when the support body is connected to the seed cable or shaft of the CZ furnace, the pivot axis will extend generally horizontally and the rod replenishment mechanism can be raised or lowered by appropriate operation of the seed cable or shaft.

8. (currently amended) The mechanism of claim 7 wherein: A rod replenishment mechanism comprising:

a support body;

a pivoted member comprising at least one rod holder suitable for holding a rod and a single crystal seed in a fixed position relative to the rod holder, the pivoted member being pivotally mounted on the support body for movement relative to the support body about a pivot axis, with a plane that includes the pivot axis extending through the free end of the seed and through each rod holder lie in a plane that includes the pivot axis; and holder, the seed extends extending in a direction away from the pivot axis axis, and the rod holder extends extending in the opposite direction away from the pivot axis; and

an attachment for connecting the support body to a seed cable or shaft of a CZ furnace so that when the support body is connected to the seed cable or shaft of the CZ furnace, the pivot axis will extend generally horizontally and the rod replenishment mechanism can be raised or lowered by appropriate operation of the seed cable or shaft.

9. (currently amended) Apparatus An apparatus for growing an ingot of single crystal silicon comprising:

a crucible adapted to contain a melt;

a lift mechanism located over the crucible;

a support body suspended from the lift mechanism; and

pivotedly mounted on the support body for movement relative to the support body about a generally horizontal pivot axis and the pivoted member having a center of gravity located such that, when at least one silicon rod is connected to the pivoted member, the pivoted member is positioned with the rod holder extending downwardly and, when no silicon rods are connected to the pivoted member, the pivoted member is positioned with the seed extending downwardly.

10. (currently amended) The apparatus of claim 9 wherein: An apparatus for growing an ingot of single crystal silicon comprising:

a crucible adapted to contain a melt;

the apparatus further comprises a silicon rod that has a generally cylindrical side surface that defines one or more recesses; and

a lift mechanism located over the crucible;

a support body suspended from the lift mechanism;

the pivoted member further comprises a pivoted member comprising at least one ring ditch holder that has two or more prongs that extend generally inwardly toward the axis of the rod and that are received in the one or more recesses and a single crystal seed in a fixed position relative to the rod holder, the pivoted member being pivotally mounted on the support body for movement relative to the support body about a generally horizontal pivot axis and the pivoted member having a center of gravity located such that, when at least one silicon rod is connected to the pivoted member, the pivoted member is positioned with the rod holder extending downwardly and, when no silicon rods are connected to the pivoted member, the pivoted member is positioned with the seed extending downwardly.

11-36. (cancelled)

37. (new) The apparatus of claim 1 wherein:

the support body is a yoke that has at least two spaced-apart legs; and

the pivoted member comprises a shaft supported by at least one of the legs.

38. (new) The apparatus of claim 37 wherein:

at least two of the legs define openings that receive the shaft so that the shaft can pivot relative to the legs; and

the at least one rod holder and a seed holder are secured to the shaft so that the at least one rod holder and the seed holder pivot with the shaft.

39. (new) The apparatus of claim 2 wherein:

the support body is a yoke that has at least two spaced-apart legs; and

the pivoted member comprises a shaft supported by at least one of the legs.

40. (new) The apparatus of claim 39 wherein:

at least two of the legs define openings that receive the shaft so that the shaft can pivot relative to the legs; and

the at least one rod holder and a seed holder are secured to the shaft so that the at least one rod holder and the seed holder pivot with the shaft.

41. (new) The apparatus of claim 7 wherein:

the support body is a yoke that has at least two spaced-apart legs; and

the pivoted member comprises a shaft supported by at least one of the legs.

42. (new) The apparatus of claim 41 wherein:

at least two of the legs define openings that receive the shaft so that the shaft can pivot relative to the legs; and

the at least one rod holder and a seed holder are secured to the shaft so that the at least one rod holder and the seed holder pivot with the shaft.

43. (new) The apparatus of claim 8 wherein:

the support body is a yoke that has at least two spaced-apart legs; and

the pivoted member comprises a shaft supported by at least one of the legs.

44. (new) The apparatus of claim 43 wherein:

at least two of the legs define openings that receive the shaft so that the shaft can pivot relative to the legs; and

the at least one rod holder and a seed holder are secured to the shaft so that the at least one rod holder and the seed holder pivot with the shaft.

45. (new) The apparatus of claim 9 wherein:

the support body is a yoke that has at least two spaced-apart legs; and

the pivoted member comprises a shaft supported by at least one of the legs.

46. (new) The apparatus of claim 45 wherein:

at least two of the legs define openings that receive the shaft so that the shaft can pivot relative to the legs; and

the at least one rod holder and a seed holder are secured to the shaft so that the at least one rod holder and the seed holder pivot with the shaft.

47. (new) The apparatus of claim 10 wherein:

the support body is a yoke that has at least two spaced-apart legs; and

the pivoted member comprises a shaft supported by at least one of the legs.

48. (new) The apparatus of claim 47 wherein:

at least two of the legs define openings that receive the shaft so that the shaft can pivot relative to the legs; and

the at least one rod holder and a seed holder are secured to the shaft so that the at least one rod holder and the seed holder pivot with the shaft.

49. (new) The apparatus of claim 10 comprising a plurality of silicon rods and a plurality of ring ditch holders, with each silicon rod being supported by one of the ring ditch holders.

50. (new) The apparatus of claim 10 wherein:
the one or more recesses is a ring ditch that encircles and extends inwardly from the generally cylindrical side surface at a location below the top of the rod to provide a radially extending flange that has a lower surface extending substantially perpendicular to the rod axis; and
the lower surface rests on at least two of the prongs.